United States Naval Academy
Mechanical Engineering Department

EM477 Computer-Aided Design

Catalog Description: EM477 Computer-Aided Design   **Credit:** 3 (2-2-3)
A design course using computer aided engineering software as a tool in engineering design. Solid modeling and finite element analysis are used to generate engineering solutions based on performance related objectives.

Prerequisites: EM371 Introduction to Design

Textbooks: None. Lecture Notes.

Course Director: Assoc. Prof. J. A. Burkhardt

Objectives[1]:
1. To understand the use of computers and software as tools to solve engineering problems in a creative and efficient manner (a,b,c).
2. To improve the visualization and communication skills of the student (d).
3. To select Capstone Design teams, develop a project and complete all necessary paper designs required for the Capstone Design Course in the Spring. (b,d).

Course Content:

No.	Topic or Subtopic	hrs.
1.	Solid Modeling	6
2.	Engineering Drawings and Dimensioning	2
2.	Finite element analysis of trusses and frames	4
2.	Finite element analysis of elastic solids	6
3.	Heat transfer analysis of solids and fins	4
5.	Project Management	2

Evaluation:

1. Quizzes	_X_	Yes	___	No
2. Homework	_X_	Yes	___	No
3. Exams	___	Yes	_X_	No
4. Laboratory Reports	_X_	Yes	___	No
5. Oral Presentations	_X_	Yes	___	No
6. Design Reports/Notebooks	_X_	Yes	___	No
7. Prototypes/Demonstrations	_X_	Yes	___	No
8. Projects	_X_	Yes	___	No
9. Any other evaluation tools used	___	Yes	_X_	No

Acquired Abilities[2]:
1.1 Students will demonstrate the ability to analyze the mechanical and thermal behavior of engineering systems. (4,6,8).

1.2 Students will demonstrate the ability to use computer aided engineering software for the design of engineering systems (4,6,8).
1.3 Students will demonstrate a understanding of basic finite element principles (2).
1.4 Students will manufacture physical prototypes of their designs to evaluate the performance of both the prototypes and the virtual prototypes used for their design (7).
2.1 Students will demonstrate an understanding of solid modeling principles (1,4,8).
2.2 Students will demonstrate the ability to use solid modeling packages to build virtual prototypes of engineering systems (4,8).
2.3 Students will prepare written laboratory reports, formal design reports and informal status reports to communicate and present technical information (6).
3.1 Students will select a design team and develop a project for the Spring Capstone Design Course (2).
3.2 Students will produce paper designs for their Capstone Design Project (2).
3.3 Students will prepare and submit a formal proposal and presentation and final report for the Capstone Design Project (5,6).

Date of Latest Revision: 11 December 2003

[1] Letters in parenthesis refer to the Program Objectives of the Mechanical Engineering Program.
[2] Section numbering refers to Course Objectives. Numbers in parentheses refer to the evaluation methods used to assess student performance.